

WE CLAIM:

1. In a mesh type communications network, a method for providing a QoS based protection of network failure scenarios comprising of:
  - a) allocating network resources for protection of a network communication service, said allocating of said network resources selectively determined based on a QoS parameter requirement for said network communication service;
  - b) receiving an alarm notification of a failure scenario disrupting network resources of said communications network interrupting said network communication service;
  - c) responsive to said alarm notification, automatically switching a communication path of said network communication service to make use of said network resources which have been pre-allocated for protection of said network communication service.
2. The method according to claim 1 wherein said communications network is a mesh-based ION and said network communication service is an optical path.
3. The method according to claim 2 wherein said network has at least one optical node comprised of an optical cross connect (OXC).
4. The method according to claim 1 wherein said allocating of said network resources is performed in response to a demand for network communication services, said demand for network communication service containing at least one

4 QoS parameter for specifying said QoS parameter requirement for said network  
5 communication service.

1 5. The method according to claim 4 wherein said QoS parameter comprises at least  
2 one of

- 3 a) a qualitative term based on the duration to recover from a failure scenario;
- 4 b) a quantitative value based on the QoS performance requirement;
- 5 c) a priority parameter based on priority rules with regard to sharing the
- 6 network resources allocated for protection; and
- 7 d) a priority parameter based on preemption rules for network resources
- 8 allocated for protection.

1 6. The method according to claim 4 wherein said QoS parameter comprises a  
2 network resources parameter identifying the relative cost of service in terms of said  
3 network resources.

1 7. The method according to claim 4 wherein said QoS parameter is a network  
2 resources parameter that specifies a maximum number of optical nodes that are  
3 permitted to be switched on a given optical path in order to provide protection.

1 8. The method according to claim 1 wherein pre-configured OXCs on a protection  
2 optical path are a shared resource to be allocated in a routing and wavelength  
3 assignment (RWA) process.

1 9. The method according to claim 1 wherein said allocating step further comprises  
2 of compiling a demand matrix which comprises of a network communication  
3 service source/destination information, a network communication service capacity  
4 requirement, and at least one QoS parameter for specifying said QoS requirement

5 for said network communication service.

1 10. The method according to claim 9 wherein said demand matrix is applied to an  
2 optimum network design method for network communication service routing and  
3 physical channel assignment with allocation of protection capacity.

1 11. The method according to claim 10 wherein said physical channel assignment is  
2 an optical channel.

1 12. The method according to claim 10 wherein said optimum network design  
2 method is applied at an initial phase of said network design, before said network is  
3 operating.

1 13. The method according to claim 10 wherein said optimum network design  
2 method is applied while said network is actively operating and an incremental  
3 change to said demand matrix is required.

1 14. In a mesh-based communications network, a system for providing a QoS based  
2 protection of network failure scenarios comprising of:

3 a) a network allocation processor allocating network resources for protection  
4 of a network communication service, said network allocation processor selectively  
5 allocating said network resources based on a QoS parameters requirement for said  
6 network communication service;

7 b) an alarm-handling module for receiving an alarm notification of a failure  
8 scenario disrupting communication between two optical nodes of said  
9 communications network interrupting said network communication service;

10 c) at least one OXC Controller responsive to said alarm notification for  
11 automatically causing switching of an optical path of said network communication

12 service to make use of said network resources, which have been allocated for  
13 protection of said network communication service.

1 15. The system according to claim 14 wherein said communications network is a  
2 mesh-based ION and said network communication service is an optical path.

1 16. The system according to claim 15 wherein said network has at least one  
2 optical node comprised of an optical cross connect (OXC)

1 17. The system according to claim 14 wherein said network allocation processor is  
2 responsive to a demand for network communication services, said demand for  
3 network communication service containing at least one QoS parameter for  
4 specifying said QoS parameter requirement for said network communication  
5 service.

1 18. The system according to claim 17 wherein said QoS parameter comprises at  
2 least one of:

- 3 a) a qualitative term based on the duration to recover from a failure scenario;
- 4 b) a quantitative value based on the QoS performance requirement;
- 5 c) a priority parameter based on priority rules with regard of sharing the
- 6 network resources allocated for protection; and
- 7 d) a priority parameter based on preemption rules for network resources
- 8 allocated for protection.

1 19. The system according to claim 17 wherein said QoS parameter comprises a  
2 network resources parameter identifying the relative cost of service in terms of said  
3 network resources.

1 20. The system according to claim 17 wherein said QoS parameter is a network  
2 resources parameter that specifies a maximum number of optical nodes that are  
3 permitted to be switched on a given optical path in order to provide protection.

1 21. The system according to claim 14 wherein pre-configured OXC's on a  
2 protection optical path are a shared resource to be allocated in a routing and  
3 wavelength assignment (RWA) process.

1 22. The system according to claim 14 wherein said network allocation processor  
2 compiles a demand matrix, said demand matrix comprised of a network  
3 communication service source/destination information, a network communication  
4 service capacity requirement, and at least one QoS parameter for specifying said  
5 QoS requirement for said network communication service.

1 23. The system according to claim 22 wherein said network allocation processor  
2 utilizes said demand matrix to perform an optimum network design method for  
3 network communication service routing and physical channel assignment with  
4 allocation of protection capacity.

1 24. The system according to claim 23 wherein said physical channel assignment is  
2 an optical channel.

1 25. The system according to claim 23 wherein said optimum network design  
2 method is performed by said network allocation processor at an initial phase of said

3 network design, before said network is operating.

1 26. The system according to claim 23 wherein said optimum network design  
2 method is performed by said network allocation processor while said network is  
3 actively operating and an incremental change to said demand matrix is required.